Flexible Shape Models for Image Analysis in an Automated Lobster Catch Assessment System

by

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Declaration

I hereby certify that this thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person except where due reference is made in the text of this thesis.

Signed: Date:

Mark Stephen Knights

Abstract

Management of fisheries is an evolving science combining multiple techniques and strategies. The involvement of the computer in industry management and research continues to grow. The area of image analysis is currently limited but continues to grow as computing equipment becomes faster and cheaper. Locating a particular object in an image and processing information about that object is a significant task that requires a great deal of processing power and finesse. The benefits of a functioning automated task that processes data on an object, such as a lobster, simply by processing an image of that object would greatly enhance the ability to manage a fishery with accurate, up to date data.

The Tasmanian Aquaculture and Fisheries Institute (TAFI) intend to create a lobster-sorting tray, which can be used on lobster fishing vessels as standard equipment. This tray would include functionality to take an image of the current lobster and estimate its sex and weight from pertinent measurements on the lobster. This research demonstrates that through the use of the Active Shape Modeller (ASM) these details can be identified and processed from an image of the lobster.

The ASM is used within an image analysis process, which can be fully automated, to draw out the required salient details of a lobster from an area of interest in the images. A series of experiments showed that the ASM was able to draw out and fully identify 77.3% images in a test set of 216 images. These images then had pertinent lengths and a sex estimated based on these measurements where 90% of the matched lobsters were sexed correctly.

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